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ABSTRACT

This course familiarizes students with manual and mechanical data processing terminology, the cycle, the basic operations, and their relationship to these two systems. It includes a familiarization with the various devices, equipment, media, and typical business applications for each system. Included are performance objectives, the course content outline, suggested learning procedures, and resource materials for students and teachers. Appended are sample test items. (Author/BP)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

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CONCEPTS OF BUSINESS DATA PROCESSING

Business Education--7743.01 (New: 7628.01)

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1971

CONCEPTS OF BUSINESS DATA PROCESSING

7743.01 (New: 7628.01)

Business Education

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Written by Barbara Smith
And Approved by the Business Education Steering Committee
For Quinmester Courses

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, FL 33132
1973

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I. COURSE TITLE--CONCEPTS OF BUSINESS DATA PROCESSING

II. COURSE NUMBER--7743.01 (New: 7628.01)

III. COURSE DESCRIPTION

A. Synopsis
Familiarizes students with manual and mechanical data processing terminology, the cycle, the basic operations, and their relationship to these two systems; includes a familiarization with the various devices, equipment, media, and typical business applications for each system.

B. Subject Status--Elective

C. Textbook
One or more of the state adopted textbooks and/or one of the department's choosing. Fundamentals of Data Processing or Introduction to Automated Data Processing is recommended as well as text-workbooks: You are a Data Processor and Business Data Processing Fundamentals.

D. Occupational Relationships
Anyone in business, but more specifically:

Clerk	Bookkeeper
Clerk-typist	Accountant
Typist	Tabulating equipment worker
Stenographer	
Secretary	Data processing workers:
	operator
	programmer
	management position
	system analyst

IV. COURSE ENROLLMENT GUIDELINES

A. Student Classification--Co-educational--11th and 12th grade preferred

B. Prior Experiences Needed--None; although Our Business World, Preview of Computational Machines, and courses in bookkeeping would provide excellent background.

C. Pretest
A pretest could be administered to a student who feels he has attained the objectives of the course as given. Should such a student successfully complete the pretest, he could enroll in the quinmester, Modern Business Data Processing.

V. COURSE OF STUDY PERFORMANCE OBJECTIVES

Upon successful completion of this course, students will be able to--

1. list chronologically five to ten given events dealing with the development of data processing ideas and/or tools;

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V. COURSE OF STUDY PERFORMANCE OBJECTIVES, Continued

2. list the four data processing systems and give one major difference of each successive system;

3. describe orally or in writing the steps taken to handle a given business problem in terms of the data processing cycle;

4. analyze the handling of the information in a given business problem in terms of the 7 basic data processing operations;

5. describe the steps taken to handle a given business problem by some manual data processing system in terms of the data processing cycle and the 7 basic data processing operations;

6. list and illustrate through examples input, processing, and output (cycles) for a piece of equipment under each of the following headings of mechanical data processing: communications, computations, and filing; and

7. describe 2 or more effects of automated procedures and state an opinion of their implications for the office worker.

VI. COURSE CONTENT

A. Equipment and Supplies
   1. Basic needs
      a. Desk
      b. Textbook or practice set or teacher-created activities
      c. Writing instruments for note taking
   2. Supplementary needs
      a. Overhead projector and screen
      b. Bulletin board examples of machinery and equipment for processing data
      c. Business machines
      d. Abacus

B. Curriculum
   1. Data processing defined
      a. History
         (1) Concepts
         (2) Tools
      b. Data processing systems overview
         (1) Manual
         (2) Mechanical
         (3) Tabulating equipment
         (4) Electronic programmable computers
      c. Data processing cycle
         (1) Input--source documents
         (2) Processing (data manipulation)
         (3) Output
      d. Data processing operations
         (1) Recording
         (2) Classifying codes

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VI. COURSE CONTENT, Continued

(3) Sorting
(4) Calculating
(5) Summarizing
(6) Communicating
(7) Storing

2. Manual data processing
   a. Basic tools and supplies
      (1) Pencil and paper
      (2) Rulers
      (3) Worksheets
      (4) Journals
      (5) Ledgers
      (6) Forms
   b. Automated tools and applications
      (1) Carbon paper
      (2) Window envelopes
      (3) Forms registers
      (4) Needlesort
      (5) Pegboard
   c. Effects of automated procedures
3. Mechanical data processing
   a. Communications
      (1) Typewriter
      (2) Duplicating equipment
      (3) Telephone, teletype, teledata equipment
   b. Computations
      (1) Listing machines
      (2) Display machines
      (3) Cash registers
      (4) Accounting machines
   c. Filing
      (1) Microfilming
      (2) Cabinets
         (a) Front or lateral drawers
         (b) Electrically operated

VII. SUGGESTED PROCEDURES, STRATEGIES, AND LEARNING ACTIVITIES

The content of the course lends itself to various teaching approaches depending on the textbook used, any practice set adopted, the make-up of the student group, and the availability of equipment in the different areas of study.

The history of data processing might well be explored through individual research assignments, oral reports, and group projects.

The laboratory method (hands-on) seems best for providing a good understanding of data processing. One simple and successful way to demonstrate data handling is through working with keysort

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VII. SUGGESTED PROCEDURES, STRATEGIES, AND LEARNING ACTIVITIES, Continued

and pegboard systems. As this usually means many students sharing the same limited equipment, a rotation plan between exercises on the two systems can be worked out.

The use of visual aids may be very helpful, particularly when equipment is lacking. Acetates, filmstrips, and films with before-showing-objectives and after-showing-review can be successful learning devices.

One successful approach has been the learning of data flow through student created forms and reports based on a student-decided project such as a class activity, school athletics, or student career interests. Students decide on the type of report, sources of information, forms, and method of collecting, coding, and processing within the limits of the classroom facilities. A final report produced by each student can be graded on neatness or appearance, a specific due date, a required accuracy, and legibility.

VIII. EVALUATIVE INSTRUMENTS

Test questions used to evaluate mastery of the performance objectives will be affected by the text used, any practice sets or simulated systems studied in detail, and methods used to teach concepts. The pretest and posttest should measure achievement of all performance objectives for this course. Sample items may be found in the Appendix.

IX. RESOURCES FOR STUDENTS

A. Books and Text-Workbooks

Freeman, M. Herbert; Hanna, J. Marshall; and Kahn, Gilbert. Accounting 10/12, Part IV, Business Data Processing Fundamentals. New York: Gregg Division of McGraw-Hill Book Company, 1968.

Kahn, Gilbert. Business Data Processing, Basic Principles and Applications. (Text-workbook) New York: Gregg Division of McGraw-Hill Book Company, 1966.

Langenbach, Robert G. Introduction to Automated Data Processing. Englewood Cliffs: Prentice-Hall, Inc., 1968.

Piper, Roger. The Story of Computers. New York: Harcourt, Brace & World, Inc., 1964.

Walsh, J. E.; Williams, M. L.; Barnett, M. P.; and Collyer, R. H. Principles of Data Processing. Toronto: Sir Isaac Pitman, Ltd., 1968.

Wanous, S. J.; Wanous, L. M.; and Warner, Gerald E. Fundamentals of Data Processing. Cincinnati: South-Western Publishing Co., 1971.

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IX. RESOURCES FOR STUDENTS, Continued

Wanous, S. J.; Wanous, D. B.; and Wagner, Gerald E. Introductory Data Processing--An Intensive Course, 2nd ed. Cincinnati: South-Western Publishing Co., 1973.

Wood, Merle W. You Are a Data Processor. (Text-workbook) Cincinnati: Southwestern Publishing Co., 1972.

B. Booklets

Educational Development. Electronic Data Processing Written for the Layman. Dayton, Ohio: National Cash Register Co., Education Center--Sugar Camp. Book 1, What is Data Processing? discusses human language and its relation to machine language, coding, sorting, computing, summarizing, recording, and communicating.

Saunders, Gilbert D. and Luskin, Bernard J. Data Processing, A Practice Set. Connecticut: McBee Systems.

X. RESOURCES FOR TEACHERS

The suggested list contains very few selected materials because data processing changes so quickly that up-to-date material is a must. There is a wealth of material published continually. Teacher's manuals and tests are available from most of the publishers of student textbooks.

A. Books

Awad, Elias M. Automatic Data Processing Principles and Procedures, 2nd ed.; and workbook, Problems and Selected Readings in Automatic Data Processing. Englewood Cliffs: Prentice-Hall, Inc., 1970.

Haga, Enoch. Understanding Automation. New York: Business Press, 1965.

B. Periodicals

Balance Sheet, The. Cincinnati: South-Western Publishing Co. Monthly: October through May.

Business Education Forum. Washington: National Business Education Association. Monthly, October through May.

Business Education World. Hightstown: Gregg Division of McGraw-Hill Book Company. Five publishings each school year.

Data Education, Journal of. Northfield, Vermont: Society of Data Educators.

Journal of Business Education. East Stroudburg: Gregg Division of McGraw-Hill Book Co. Monthly, October through May.

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X. RESOURCES FOR TEACHERS, Continued

C. Visual Aids

Films may be selected from Dade County AV Materials catalog or are available through local data processing firms.

Filmstrips:

The following 20-minute, 35 mm color filmstrips are available from Friden, Inc., 2350 Washington Avenue, San Leandro, CA 94577.

Basic Data Processing.
Automation/Today's Modern Office.

Transparencies:

Introduction to Data Processing. Cincinnati: South-Western Publishing Co. 100 transparencies ($175, with viewing frame and manual).

Wall Charts:

Data Processing Wall Charts. Teaching Aids, Inc., P. O. Box 3527, Long Beach, Calif. 90803. Set of three 19" x 25" charts, $12 a set.

D. Field Trips

Eastern Airlines, Miami Headquarters Office have an excellent system for communications processing. Call the manager of the word processing center to make arrangements for a visit of a small group of students (up to 20).

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APPENDIX

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SAMPLE TEST ITEMS

The following suggested test items presuppose the learning of manual data processing concepts through the use of a practice set, keysort and peg-board, and calculating machines of various types.

The number in parentheses in front of each question refers to the related objective. The answers given are suggested acceptable answers and are by no means the only possible answers.

(1) 1. Indicate the order in which the following events occurred by numbering them from one to ten.

a. The concept of zero was adapted by the Arabs from the hindus. 6

b. The exchange of goods by force rather than by trade created no need for the recording of transactions. 1

c. Cybernetics, the science of control and communication in both animals and in machines, was introduced and popularized by the mathematician, Norbert Wiener. 10

d. Manual coding methods, based on marginal notches and perforations, were developed to aid sequence checking and selection. 8

e. Julius Ceasar insisted on proper accounting of receipts and disbursements and thus maintained the treasury of the Roman Empire. 4

f. Families joined into tribes and nations. The need for recordkeeping grew; and scratches on rocks, notches on trees, and marks on mud walls were used. 2

g. The Babylonians stored tablets in jars--an early filing system. 3

h. In England, wooden tallies were used. William the Conqueror made a survey which showed all of his properties and taxes due. 5

i. The word "automation" was first used by D. D. Harder who was then with the General Motors Corporation. He defined it initially as the "automatic handling of parts between progressive production processes." 9

j. Melvil Dewey published the Dewey Decimal Classification of information where knowledge is divided into ten major groups with subdivisions. 7

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(2) 2. Indicate the order in which the following events occurred by numbering them from one to eight.

a. Christopher Latham Sholes developed the first practical typewriter. 2
b. The Remington Model 4 typewriter was placed on the market with a number of improvements made by the mechanics, Jeanne and Clough. The first use of lower-case letters was one major achievement of this model. 5
c. Louis Traub and Frank McGurrin competed in a contest to determine whether two-finger typing with each hand was better than the all-finger approach. McGurrin, using the all-finger approach, won the contest with speeds of 96.5 actual words a minute on straight copy. 7
d. John Mills invented the first typewriter. 1
e. Bates Torrey published a "Manual of Practical Typewriting" describing the method of touch typewriting for the first time. 8
f. Remington and Sons contracted to manufacture the first typewriter, the Remington No. 1. 3
g. The typewriter shift key was developed. 4
h. Frank McGurrin of Salt Lake City was the first man to learn how to type without looking at the keyboard, and was the first man to use the all-finger approach in this achievement. 6

(1) 3. Indicate the order in which the following events occurred by numbering them from one to ten.

a. Electromechanical machines came into general use. 8
b. William Oughtred developed the slide rule. 2
c. D. D. Parmalee obtained a U. S. Patent for the first key-driven calculator. 5
d. Balise Pascal developed a digital counter. 3
e. John von Neumann, a mathematician at the Institute for Advanced Study in Princeton, New Jersey, did original work in developing computers. He and his co-workers laid out fundamental designs for modern computers. 10
f. The first accounting machine was developed for National Cash Register Company by Charles F. Kettering. 6
g. The abacus was invented in China; the soroban, in Japan. 1
h. Charles Babbage designed the difference engine to print mathematical tables. 4
i. Professor Aiken of Harvard completed the Automatic Sequence Controlled Calculator, now known as Mark 1. 9
j. Oscar and David Sundstrand invented the ten-key adding machine. 7

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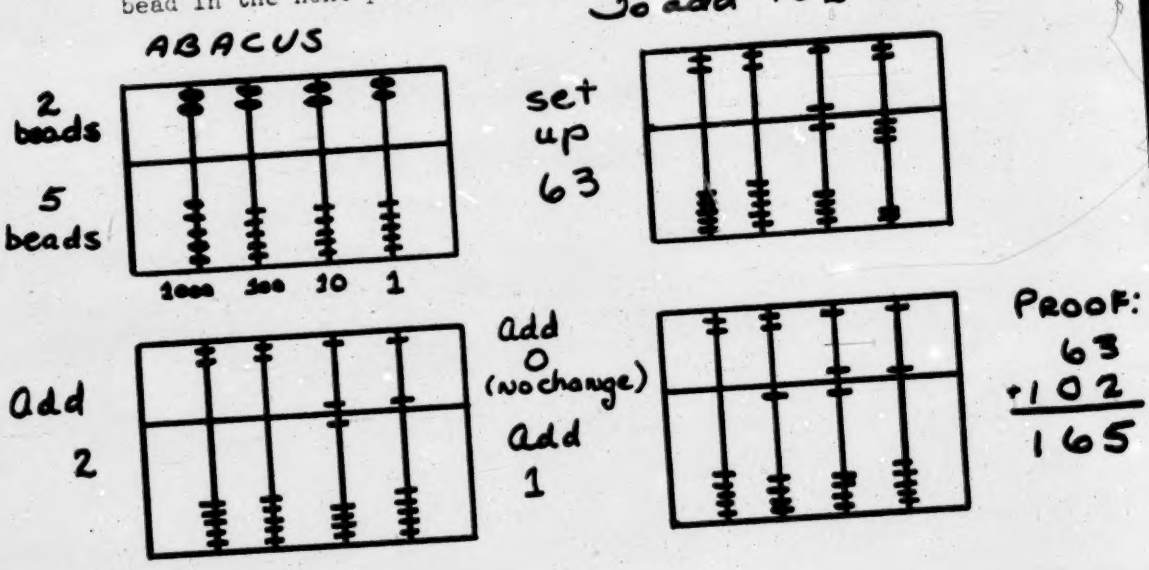
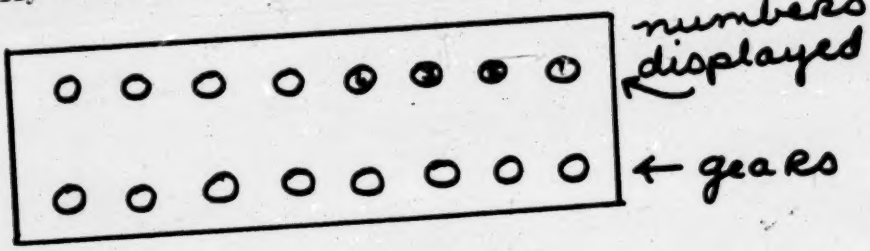
SAMPLE TEST ITEMS, Continued

(1) 4. Describe through illustration and explanation the principle of operation of the abacus or Pascal's machine arithmetique.

ANSWER: The frame is divided into two sections; the upper section has two beads representing 5 each and the lower section has 5 beads representing 1 each. Each vertical row represents place value. In adding, start on the lower section far right slipping to the center the appropriate numbers of beads, then for the number being added, slip those beads toward the center. Each time 5 beads in the lower frame are together at the center, they are returned and a 5 bead is centered in that place value. Each time two 5-point beads are centered, they are returned and 1 bead in the next place value position is centered.



Pascal's Machine Arithmetique: Gears were placed in a row, each gear having one revolution for each number 1-9 and representing one place value. Each time the gear made a complete revolution (reaching the tenth tooth), it would trip the next gear to start at one. The gears were turned manually to the desired number.



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(2) 5. List the four data processing systems in development order and give the major difference in each successive system, giving examples where appropriate.

ANSWER: Manual data processing: handling data by "hand" using simple devices such as pencils, pens, forms, etc., and automated manual systems such as pegboards and keysort systems.

Mechanical data processing: handling data through the use of various mechanically operated types of machines such as duplicating machines, calculating machines, posting machines, and machines for communicating--such as the teletype.

Tabulating equipment system: handling data through the use of punched-cards and a series of unit record machines designed to carry out the basic data processing operations.

Computer systems, electronic programmable machines: handling data through high-speed electronic machines using magnetically stored programs for processing.

(4) 6. Illustrate the seven operations of data processing in solving the following business problem: Your supervisor has asked you for a report on the electric typewriters in the offices of a large business. He wants to know how many typewriters are on hand, where they are located, how old they are, and what kinds of models they represent.

ANSWER: Classifying: Typewriters may be classified by brand name, serial number, age, location, model, or by any other identification using some type of alphanumeric or numeric coding system.

Calculating: Determining the number of each brand and model, the total number on hand, the number of each age, and the number used in each department.

Sorting: Grouping them according to location, then under location by models, then by age under models.

Recording: Original listing of sorted information.

Summarizing: Computing totals by required classifictions.

Communicating: Writing the report and delivering it to the supervisor by mail, personal delivery, or telephone.

Storing: Filing intermediate findings for later use and saving final report for future reference or use in some related report.

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(3) 7. Analyze the handling of a payroll in terms of the data processing cycle.

ANSWER: Input: Source documents--Time cards and/or job costing tickets
Memory--Individual employee records

Processing: Calculating gross earning, deductions, and net pay

Output: Payroll checks, updated employee and company payroll records
Memory--Updated records stored for next payroll period

(5) 8. Assume you are using a needlesort system for job cost accounting. Two jobs are completed. The problem is to report the total cost of each job on summary cards, one for each job. Describe the steps taken to handle the job in terms of the data processing cycle and the 7 basic data processing operations.

ANSWER: Input: Classifying--labor tickets and material requisitions by prescribed numbers and codes
Recording--employee time and rate charged to job
Recording--material used on job from material requisitions

Processing: Sorting--by job number
Sorting--labor tickets from material requisitions
Computing--overhead costs, totaling costs to one job
Summarizing--all costs, labor, material, overhead

Output: Recording--on job summary cards
Communicating--to proper department needing information
Storing--in file for future use

(6) 9. Relate the data processing cycle to the use of a calculating machine, a communications machine, and a filing device.

ANSWER: Ten-key adding-listing machine:
Input: Figures from source document such as invoice, checkbook
Processing: Computing for required information
Output: Adding machine tape

Typewriter:
Input: Shorthand notes of a dictated letter
Processing: Changing shorthand symbols into typewritten words
Output: Finished letter

Microfilming:
Input: Source document to be filed such as an employee application, piece of correspondence, or check
Processing: Filming
Output: Microcard to be used with microfilm reader

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(7) 10. Discuss two changes brought about by automated procedures and their implications for the worker.

ANSWER: Automation has eliminated monotonous repetition in many applications thus giving the worker released time for "thinking-type work" rather than repetitious work.

Automation has eliminated much duplication of information and requires the worker to be more accurate in the first place so that an original error will not be compounded into many because of one writing used to complete several forms.

Automation has increased the speed and efficiency of many business tasks, requiring the worker to be selective in the use of this freed time.